DESIGN AND USABILITY OF AN ADAPTED INDOOR ROUTE GUIDANCE SYSTEM

Adapting the route instruction type to the complexity of the decision point.

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1. Introduction

The indoor environment can be very complex and as such can make people feel uncomfortable while navigating indoors (Giudice et al., 2010). A well-established theory to quantify building complexity is space syntax (Montello, 2014), which is a collection of theories and methods to quantify the relation between both indoor and outdoor space on the one hand and society on the other hand. Space syntax is known to correlate with wayfinding performance during explorative wayfinding, but few studies have been done on the correlation with wayfinding performance during guided wayfinding. When people are being guided by a wayfinding system on their smartphone, they might behave differently or have different needs, depending on the decision point. An adapted wayfinding system adapts it's characteristics to these changing needs (Reichenbacher, 2003). One of the aspects that can be adapted is the type of route instruction. For example, at very complex decision points a 3D-simulation of the required turn might be more helpful than a map. This research analyzes the relationship between building complexity, quantified through space syntax, and usability of route instructions, resulting in the design of an adapted indoor route guidance prototype.

2. Online survey and field experiment

In a first phase, an online survey was conducted to study the relationship between space syntax and complexity perception during route guidance (De Cock et al., 2019, 2020). Results showed that this relationship depended a lot on the decision point category: taking turns was most complex at convex, central spaces, while this was reversed for starting and ending a route and to change levels. Moreover, apparently the preference for route instruction types during route guidance also depended on the decision point category: symbols + text were preferred to start and end a route, 3D-simulations + text at central decision points and photo + text at other decision points. In a second phase, a web-based adapted route guidance prototype was designed, based on the results of the online survey. A field experiment was conducted, during which people were being guided by the system on a smartphone, while their eye movements were being tracked to measure the induced cognitive load. The participants were divided in two groups, one group received adapted route instruction types and one group saw only photo + text instructions, but both groups received the instruction on their smartphone by use of ultra-wideband sensors. The results of this test revealed that less wayfinding errors were made with the adapted system compared to the non-adapted system. Moreover, cognitive load on complex decision points could be decreased by using 3D-simulations, while cognitive load in convex spaces could be increased by using symbol + text instructions.

3. VR experiment

In the last phase of the research a VR experiment will be conducted, where participants will be guided in a virtual model of a building by the VR version of the adapted route guidance prototype, while their eye movements are being measured by an integrated eye-tracker. In VR, participants are to a certain extent immersed in the environment, similar to a field experiment and environmental parameters can be controlled, similar to an online survey. As such, the VR experiment combines the advantages of the previous two research mediums. The goal of this last study is to cross validate the results of the previous studies.

References

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